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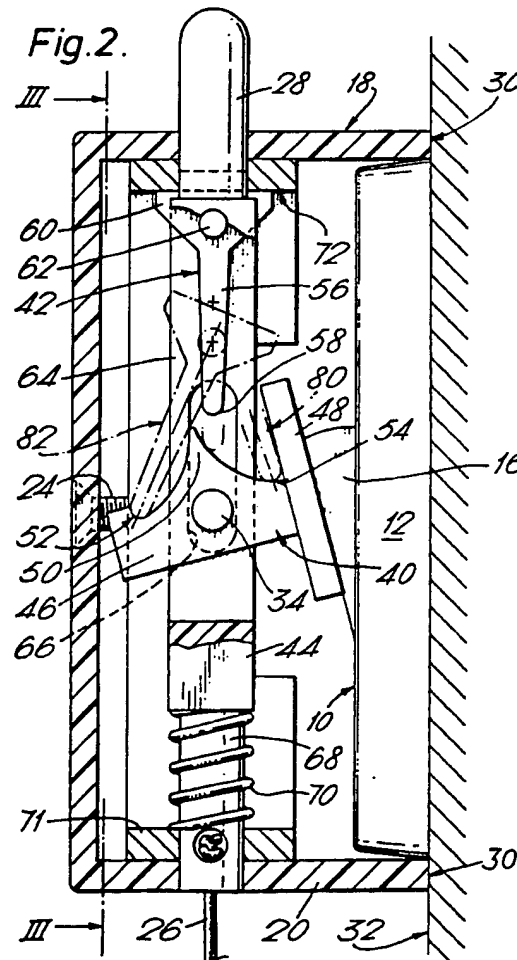
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(58) Field of search

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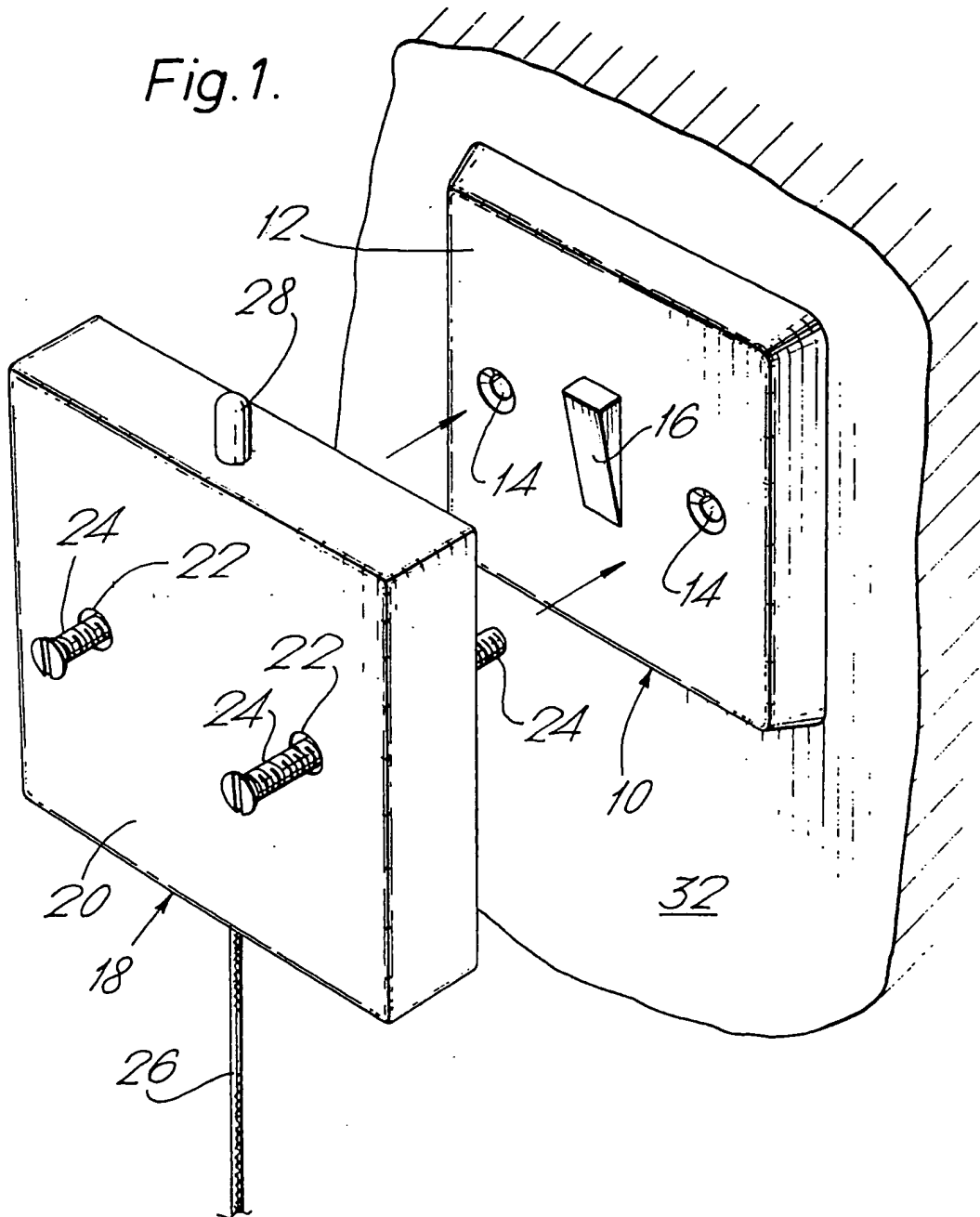
(54) Switching mechanism

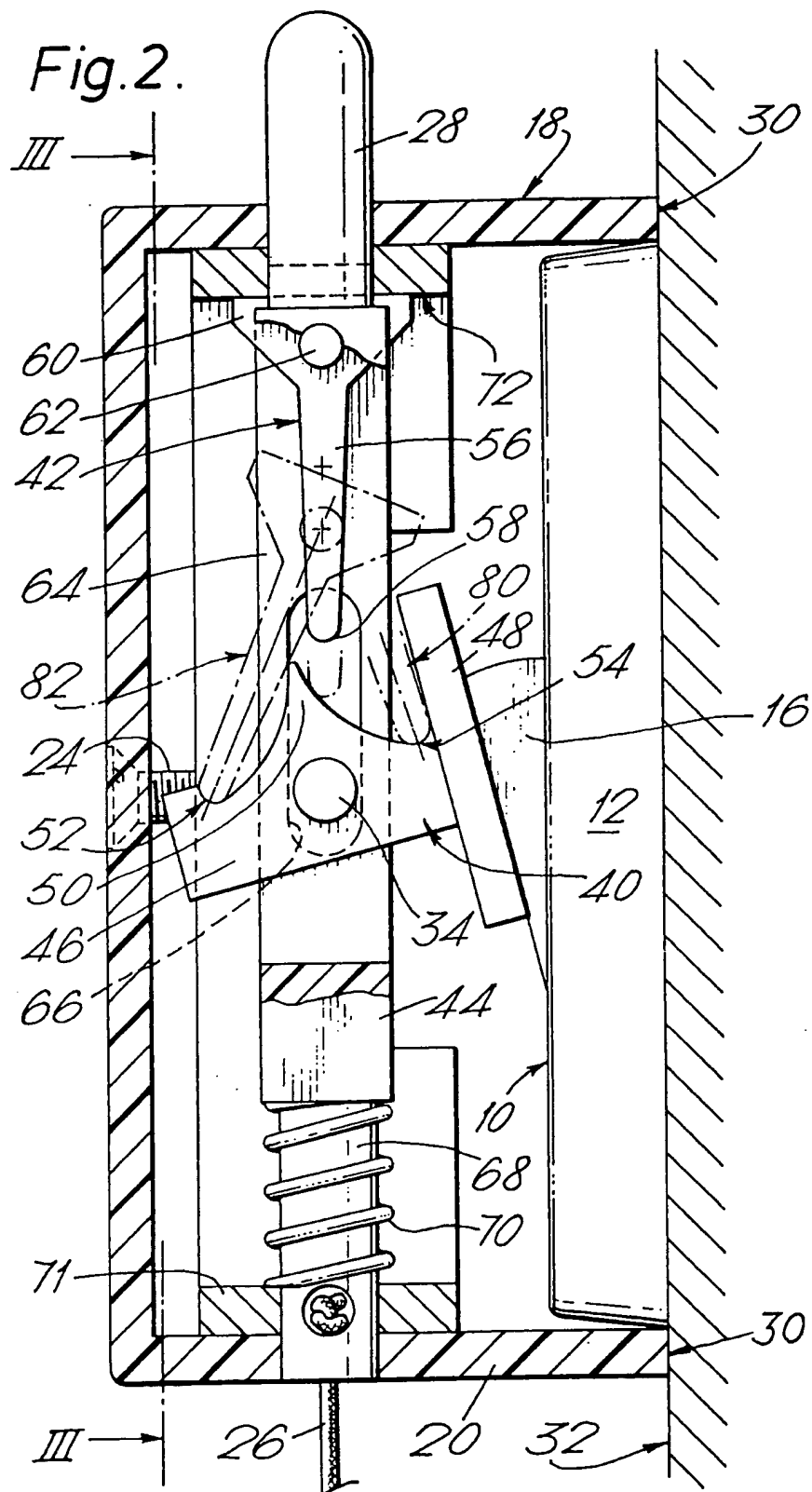
(57) A switching mechanism 18 is an ancillary part of an electric switch 10 or other device changeable between two conditions. As an ancillary to a tumbler switch the mechanism 18 has a T-shaped element 40 whose head 48 engages the tumbler 16 and whose stem 46 has a profile including two abutments 52, 54 separated by an apex 50. The T-shaped element 40 is pivotally movable between two positions to operate the tumbler 16 "on" or "off" by successive movements of a second element 42 pivotally carried by a third element 44 connected to an operating cord 26. The second element 42 is deflected by the apex 50 from a median position into engagement with one or other abutment. Further movement of the second element 42 displaces the first element 40. A spring 70 restores the third element 44 on release of the cord 26 and the second element 42 is restored to its median position when its head 60 engages the housing surface 72.

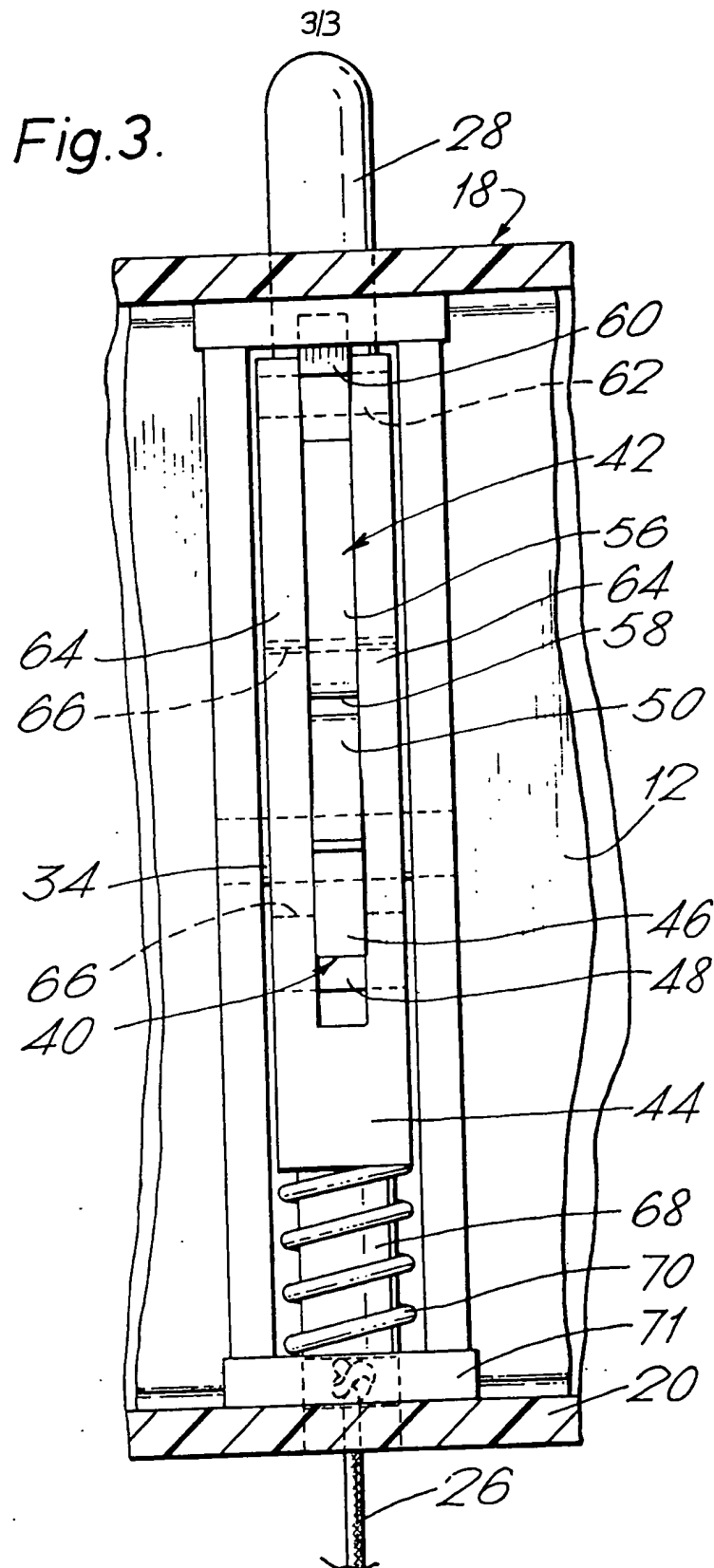


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Fig. 1.







## SPECIFICATION

## Switching mechanism

- 5 The invention relates to switching mechanism for use particularly, though not exclusively, in operating electric switches.

One form of the invention is usable as an ancillary mechanism with a wall-mounted electric switch having a manually operable tumbler protruding from a wall-plate enabling, for example, a child to operate the tumbler in either sense to change its condition by pulling a cord. However, the invention is applicable not only as an ancillary to an electric switch or as its operating mechanism but is applicable in relation to any situation where changes between two conditions in either direction are required to be effected.

20 Switching mechanism, according to the invention, comprises a support supporting first and second elements, the first element being angularly displaceable about a pivot axis between first and second positions and having a profile comprising an apex between two abutments, the apex and abutments being eccentric to said axis, and the second element being movable relatively to the support in first and second mutually opposite directions, respectively, towards and away from said apex, the second element on successive movements in said first direction being deflected by said apex from a median position alternately into engagement with one or the other abutment to displace the first element alternately in opposite senses about said axis.

Preferably, the second element is mounted on, and is deflected relatively to, a third element which is supported by, and movable relatively to, the support, the second element being restored to said median position upon each successive movement of the third element in said second direction.

Preferably, the second element is pivotally mounted on the third element; optionally, the second element has a face which upon each successive movement of the third element in said second direction engages and lies parallel to a stop surface carried by the support, said face being in alternately oppositely inclined positions relative to said stop surface in successive deflected positions of the second element, and said stop surface being intermediate said inclined positions.

55 In a modification, the second element is deflectable against spring means which restores the second element to said median position.

In another modification, the second element is non-pivotally secured to the third element and is resiliently deflectable from said median position.

One form of mechanism will now be described by way of example to illustrate the invention with reference to the accompanying

drawings, in which:-

*Figure 1* is a diagrammatic isometric view of the mechanism and of a wall switch of the tumbler type on which the mechanism is to be mounted;

*Figure 2* is a diagrammatic vertical section through the mechanism shown in *Fig. 1*; and

*Figure 3* is a diagrammatic vertical section on the line III-III in *Fig. 2*.

75 The tumbler switch 10 shown in *Fig. 1* comprises a finger-plate 12 normally secured by two screws which pass through holes 14 into screwed holes in a switch-box (not shown) in a recess in the wall and covered by the finger-plate 12. The switch tumbler 16 protrudes through a central rectangular aperture in the finger-plate 12.

The mechanism 18 for use with the switch 10 includes a rectangular housing 20 having two holes 22 spaced apart the same distance as the holes 14. The housing 20 is secured to the switch 10 by removing the screws from the holes 14, positioning the housing 18 over the finger-plate 12, and securing the mechanism 18 by two screws 24 long enough to pass through the finger-plate and enter the screwed holes in the switch box.

The mechanism 18 includes an element, described further with reference to *Figs. 2* and 3, which engages the tumbler 16. The element is movable by pulling a cord 26 hanging down from the mechanism so that the switch 10 is operable by a small child who cannot reach the tumbler 16. Optionally, the mechanism 18 includes a push-button 28 by which the element is also movable to operate the switch 10 at adult level.

*Figs. 2* and *3* show the internal parts of the mechanism 18 which are supported by the housing 20. The housing 20 fits over the finger-plate 12 and edge surfaces 30 of the housing 20 engage the wall 32. The housing is, for example, made of plastics material and includes spaced apart journal members which support a pin 34. The housing acts as a support for first, second and third elements 40, 42, 44, respectively, which are movable in response to pulling of the cord 26 or the push-button 28. The first element 40 is T-shaped having its stem 46 pivotally mounted on the pin 34 and having its head 48 engaging the front surface of the tumbler 16. The first element has a profile comprising an apex 50 between two abutments 52, 54, the apex and the abutments being eccentric to the pivotal axis provided by the pin 34.

The second element 42 is also T-shaped, having a long stem 56 with an extremity 58 engageable with the profile of the first element and having a head 60 pivotally mounted on a pin 62 carried by the third element 44.

The third element 44 is of elongated U-shape, the two limbs 64 of the U having opposed slots 66 accommodating the pin 34 and extending on either side of the first ele-

ment 40. The second element 42 also lies between the limbs 64, the pin 62 extending between the limbs near their upper ends. The base of the U of the third element 44 is integral with a cylindrical rod 68 to which the cord 26 is attached. A compression spring 70 encircles the rod 68 and is trapped between the base of the U and a stop 71 fixed to the housing 20.

The lower end of the push-button 28 engages the top of the head 60 of the second element 42. The top of the head 60 is also engageable with a stop surface 72 in the inoperative condition of the mechanism. The stop surface 72 is on an abutment fixed to the housing 20.

The third element 44 is supported and guided partly by the rod 68 sliding against the edge of the hole in the lower wall of the housing 20. The third element is also supported and guided by the edges of the slots 66 sliding against the pin 34 and also by the sides of the limbs 64 sliding against the journal members supporting the pin 34.

## 25 OPERATION

When the cord 26 is pulled down, or when the push-button 28 is depressed, the third element 44 descends carrying the second element with it. The extremity 58 of the limb 56 of the second element 42 engages the profile on the first element 40, to one side of the apex 50. As the third and second elements continue to descend, the second element is deflected about its pivot pin 62 to the position indicated at 80 in Fig. 2. In this position the extremity 58 engages the abutment 54 of the first element 40. On further downward movement, the second element 42 displaces the first element 40 clockwise as seen in Fig. 2 about the pin 34.

As the first element 40 is displaced, its head 48 slides against the front surface of the tumbler 16 and pushes it to its position opposite to that shown in Fig. 2, so operating the switch 10. In that position no further displacement of the first element 40 or movement of the third and second elements is possible.

On release of the cord 26 or the button 28, the compressed spring 70 pushes the third element 44 upwards to its start position. When the head 60 of the second element 42 engages the surface 72 the second element is automatically centralised in its median position shown in full lines in Fig. 2. On the next downstroke, the extremity 58 of the second element 42 engages the other abutment 52 and displaces the first element back to the position shown in Fig. 2. At the end of that downstroke the second element 42 occupies the position shown by broken lines at 82 in Fig. 2. The first element 40 and the second element 42 are thus angularly displaced alternately in opposite senses on successive down-

strokes of the third element 44.

The first, second and third elements 40, 42, 44 are conveniently made of plastics material such as polytetrafluoroethylene or the material sold under the Trade Mark "Nylon".

In modifications (not shown): (i) the second element is restored to its median position by a spring; (ii) the second element is non-pivotally secured to the third element and is resiliently deflectable from its median position; (iii) the second element is a first (e.g. horizontal) bar and the third element is two spaced filaments (e.g. cords) extending downwardly from the ends of the bar and joined to the ends of a lower bar to the centre of which the cord 26 is secured. Instead of the spring 70, an extension spring connects the upper bar (the second element) to the top wall of the housing 20. The upper bar is engageable alternately with the abutments 52, 54.

The mechanism described above can be adapted for use in a electric switch so as to operate the switch contacts. As an ancillary mechanism it has industrial and other applications, for example where a switch is required to be converted for operation from a remote location. This is of special advantage for example where the area in which the switch is located has become a hazardous area and operation from a location outside the hazard zone is required. Furthermore, the use of the mechanism avoids the need for any alteration or disconnection of the electrical side of the switch and avoids the electrical installation work which would otherwise be necessary to re-locate the switch. Such work may well be very expensive or even impossible. The operation of the mechanism is unaffected by the orientation of the switch with which, or in which, it is used.

The mechanism also offers the safety advantage that the cord enables safe operation of a switch by a person whose hands are wet. The mechanism can be modified so as to act upon the operating member of switches other than of the tumbler type.

In a modification (not shown) the housing is narrower than the switch finger plate instead of engaging the wall. The housing has two lateral lugs through which the screws 24 pass.

## CLAIMS

1. Switching mechanism comprising a support supporting first and second elements, the first element being angularly displaceable about a pivot axis between first and second positions and having a profile comprising an apex between two abutments, the apex and abutments being eccentric to said axis, and the second element being movable relatively to the support in first and second mutually opposite directions, respectively, towards and away from said apex, the second element on successive movements in said first direction

being deflected by said apex from a median position alternately into engagement with one or the other abutment to displace the first element alternately in opposite senses about said axis.

2. Mechanism according to Claim 1, in which the second element is mounted on, and is deflected relatively to, a third element which is supported by, and movable relatively to, the support, the second element being restored to said median position upon each successive movement of the third element in said second direction.

3. Mechanism according to Claim 2, in which the second element is pivotally mounted on the third element.

4. Mechanism according to Claim 3, in which the second element has a face which, upon each successive movement of the third element in said second direction engages and lies parallel to a stop surface carried by the support, said face being in alternately oppositely inclined positions relative to said stop surface in successive deflected positions of the second element and said stop surface being intermediate said inclined positions.

5. Mechanism according to Claim 3, in which the second element is deflected against spring means which restore the second element to said median position.

6. Mechanism according to Claim 1 or Claim 2, in which the second element is non-pivotally mounted on the third element and is resiliently deflectable from said median position.

7. Mechanism according to Claim 1 or Claim 2, in which the second element is a first bar and the third element is two spaced filaments extending from the bar and joined to a second bar and in which the first bar is connected to the support by a tension spring.

8. Mechanism according to any claim of Claims 2 to 6, in which the movement of the third element in one of said first and second directions is opposed by spring means.

9. Mechanism according to Claim 8, in which the third element is T-shaped and in which said pivot axis is normal to the plane of the T, the head of the T being slidably engageable with a tumbler of an electric switch when the support is mounted adjacent a finger-plate of the switch with said pivot axis parallel to the pivot axis of the tumbler.

10. Mechanism according to Claim 9, in which the first element is mounted on a pivot pin supported by the support and defining said pivot axis, and in which the third element is U-shaped and has two limbs one on each side of the first element and each having a lengthwise slot through which the pivot pin extends, the second element being mounted between the limbs.

11. Mechanism according to any preceding claim, in which the second element is movable by a pull cord.

12. Mechanism according to any preceding claim in combination with an electric switch in which the first element engages the operating member of the switch.

13. Mechanism according to Claim 12, in which the support is secured by two screws extending through the holes in an adjacent part of the switch which part is normally secured to the remainder of the switch by screws passing through those holes.

14. An electric switch comprising mechanism according to any of Claims 1 to 8 and a contact or contacts operable by the mechanism.

15. Mechanism according to Claim 1, substantially as hereinbefore described with reference to the accompanying drawings.

16. Mechanism according to Claim 1, in combination with an electric switch substantially as hereinbefore described with reference to the accompanying drawings.

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